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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/707,368
Filing Date: December 09, 2003
Appellant(s): BOYD ET AL.

MAILED

OCT 30 2007

Technology Center 2100

Angela M. Brunetti (Reg. No 41,647)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 23rd day of July, 2007 appealing from the Office action mailed 22nd day of February, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Sharp, R.S. et al, "Optimal Preview Car Steering Control" Vehicle System Dynamics, Vol 35, no. ICTAM, 2001

Peng et al, "Optimal Preview Control for Vehicle Lateral Guidance", California Partners for Advanced Transit and Highways 1991

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharp et al., "Optimal Preview Car Steering Control," published in Vehicle System Dynamics, Volume 35, no. ICTAM, in 2001, in view of Peng et al., "Optimal Preview Control for Vehicle Lateral Guidance" California Partners for Advanced Transit and Highways 1991.

As per claim 1,

Sharp discloses a simulation system for simulating an operation of an automotive vehicle comprising:

an input providing vehicle information **(page 2 section 2)** and path information **(page 4 section 3)**, an initial steering wheel input (**page 6 first full paragraph**, *when k=1*) and an initial look ahead point (**page 4 section 3 second paragraph**, *y.sub.rh*);

a controller having a vehicle computer model therein **(page 1 last paragraph lines 8-11)**, said controller programmed to:

determine a curvature of an intended path from the path information **(page 5 figure 3,** *taught as computing the road angle***)**,

determine a look ahead scale factor as a function of the intended path **(page 10,** *second full paragraph, taught as setting a preview time based on the curvature of the path***)**,

determine a revised look ahead point as a function of the look ahead scale factor **(page 10,** *second full paragraph, taught as using the preview time in order to determine the preview point ahead of the car***),**

determine a steering wheel angle input to the computer model by comparing the revised look ahead point and the intended path **(page 10,** *second full paragraph, taught as "using the perceived path error to steer the 'correct' way"***),**

operate the computer model with the steering wheel angle input **(page 5 last paragraph-page 6 first paragraph,** *taught as using the system with the steering wheel angle input***),** and

generate an output in response to the vehicle model and the initial steering wheel input **(page 5 figure 4,** *taught as the error being based on the steering wheel angle input***).**

Sharp does not disclose expressly the path information comprising a road radius of curvature, or the look ahead scale factor being a function of the intended path radius of curvature. Peng discloses a method controlling a vehicle using an optimal preview control algorithm. Peng teaches the input having path information containing a radius of curvature (**page 6 last paragraph**). Peng further teaches determining a look ahead scale factor as a function of the intended path radius of curvature (**page 9 equation 17**, *taught as a function of w, which is disclosed in page 6 last paragraph as the inverse of the radius of curvature*).

It would have been obvious to one of ordinary skill in the art of steering control, at the time of the present invention, to modify Sharp's method of determining a look ahead scale factor with Peng's use of the radius of curvature. The motivation for doing so would have been to reduce error in calculating preview data by taking into consideration changes in road curvature (Peng page 5 first two paragraphs).

As per claim 2,

Peng teaches the look ahead scale factor being directly proportional to the radius of curvature of the intended path **(page 9 equation 17).**

As per claim 3,

Sharp teaches during straight-line vehicle travel, the look ahead scale factor being about 62 percent of a predetermined maximum scale factor (**page 10 second full paragraph, *taught as the scale factor being 1.5 at high speeds or 1, which is 2/3 of the maximum of 1.5, at low speeds***). Setting the scale factor to 62 percent of a maximum is considered an obvious design choice, as it is unclear exactly how close to 62 percent the scale factor would have to be to meet the claim.

As per claim 4,

Sharp teaches a method of operating a vehicle computer model having vehicle information **(page 2 section 2)** and path information **(page 4 section 3)** therein comprising:

determining a curvature of an intended path from the path information **(page 5 figure 3,** *taught as computing the road angle***),**

determining a look ahead scale factor as a function of the intended path curvature **(page 10,** *second full paragraph, taught as setting a preview time based on the curvature of the path***),**

determining a look ahead point as a function of the look ahead scale factor **(page 10,** *second full paragraph, taught as using the preview time in order to determine the preview point ahead of the car***),**

determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path **(page 10,** *second full paragraph, taught as "using the perceived path error to steer the 'correct' way"***),**

dperating the computer model with the steering wheel angle input **(page 5 last paragraph-page 6 first paragraph,** *taught as using the system with the steering wheel angle input***).**

Sharp does not disclose expressly the path information comprising a road radius of curvature, or the look ahead scale factor being a function of the intended path radius of curvature. Peng discloses a

method controlling a vehicle using an optimal preview control algorithm. Peng teaches the input having path information containing a radius of curvature (**page 6 last paragraph**).

It would have been obvious to one of ordinary skill in the art of steering control, at the time of the present invention, to modify Sharp's method of operating a vehicle computer model with Peng's use of the radius of curvature. The motivation for doing so would have been to reduce error in calculating preview data by taking into consideration changes in road curvature (Peng page 5 first two paragraphs).

As per claim 5,

Sharp teaches the look ahead scale factor being directly proportional to the curvature of the intended path **(page 10 last paragraph, taught as high oscillation requiring higher preview times)**.

As per claim 6,

Sharp teaches during straight-line vehicle travel, the look ahead scale factor being about 62 percent of a predetermined maximum scale factor (**page 10 second full paragraph, *taught as the scale factor being 1.5 at high speeds or 1, which is 2/3 of the maximum of 1.5, at low speeds***). Setting the scale factor to 62 percent of a maximum is considered an obvious design choice, as it is unclear exactly how close to 62 percent the scale factor would have to be to meet the claim.

As per claim 7,

Sharp teaches a method of operating a vehicle computer model having vehicle information **(page 2 section 2)** and path information **(page 4 section 3)** therein comprising:

providing an initial steering wheel angle (**page 6 first full paragraph**, *when k=1*);

determining a curvature of an intended path from the path information **(page 5 figure 3,** *taught as computing the road angle***)**;

determining a look ahead scale factor as a function of the intended path curvature **(page 10,** *second full paragraph, taught as setting a preview time based on the curvature of the path***)**;

determining a look ahead point as a function of the look ahead scale factor **(page 10, second full paragraph,** *taught as using the preview time in order to determine the preview point ahead of the car***)**;

when the vehicle is not on target, determining a revised steering wheel angle input to the computer model by comparing the look ahead point and the intended path **(page 10, second full paragraph,** *taught as "using the perceived path error to steer the 'correct' way"***)**;

operating the computer model with the revised steering wheel angle input **(page 5 last paragraph-page 6 first paragraph,** *taught as using the system with the steering wheel angle input***)**; and

when the vehicle is not on target, maintaining the initial steering wheel angle **(page 6 last paragraph – page 7 first paragraph,** *taught as when q1 and q2 are low, which keeps the vehicle on target, the steer angle is maintained***)**.

Sharp does not disclose expressly the path information comprising a road radius of curvature, or the look ahead scale factor being a function of the intended path radius of curvature. Peng discloses a method controlling a vehicle using an optimal preview control algorithm. Peng teaches the input having path information containing a radius of curvature (**page 6 last paragraph**).

It would have been obvious to one of ordinary skill in the art of steering control, at the time of the present invention, to modify Sharp's method of operating a vehicle computer model with Peng's use of the radius of curvature. The motivation for doing so would have been to reduce error in calculating preview data by taking into consideration changes in road curvature (Peng page 5 first two paragraphs).

As per claim 8,

Sharp teaches the look ahead scale factor being directly proportional to the curvature of the intended path **(page 10 last paragraph, taught as high oscillation requiring higher preview times)**.

As per claim 9,

Sharp teaches during straight-line vehicle travel, the look ahead scale factor being about 62 percent of a predetermined maximum scale factor (**page 10 second full paragraph, *taught as the scale factor being 1.5 at high speeds or 1, which is 2/3 of the maximum of 1.5, at low speeds***). Setting the scale factor to 62 percent of a maximum is considered an obvious design choice, as it is unclear exactly how close to 62 percent the scale factor would have to be to meet the claim.

(10) Response to Argument

10.1 **Appellants argue:**

10.1.1 "The Examiner concludes that it would have been obvious to modify Sharp's method with Peng's use of the radius of curvature and that the motivation to do so would be to reduce error in calculating preview data by taking into consideration changes in road curvature.

10.1.2 Applicant's respectfully traverse. It is respectfully asserted that the teachings of Sharp are specifically independent of the path characteristics and that there is no motivation to combine the Sharp reference with such a reference. The Sharp reference is directed to a study of driver preview time as a function of travel speed for path error minimization. It is not directed to, nor does it concern itself with any variation that is a function of the intended path curvature as claimed in the present invention. Therefore, no motivation exists to combine the teachings of Sharp with a reference that discloses variation as a function of the intended path curvature.

10.1.3 According to the teachings of Sharp, only vehicle speed, as it related to preview time as a function of attitude control, path tracking, and steering input was studied by Sharp. Further, the preview time taught in Sharp is varied within any given model based only on vehicle speed and is independent of path curvature. Sharp teaches that path tracking control systems require varying

preview times based only on vehicle speed. For example, if steering input accuracy is a concern, then a very long preview time is required for a vehicle traveling at high speeds.

10.1.4 It is respectfully asserted that Sharp teaches that when a path tracking control scheme is desired, one must choose which type of error correction to emphasize in order to determine a preview time for accurate path tracking. It is respectfully asserted that Sharp teaches path tracking error and its teachings are independent of the characteristics of the path itself.

10.1.5 It is respectfully asserted that no motivation to include road radius of curvature in the control scheme of the Sharp reference exists. For this reason, it is respectfully requested that the rejections under 35 U.S.C. § 103 be withdrawn and a Notice of Allowance is earnestly solicited." (Brief: middle of page 6 to top of 7)

10.2 **Examiner Response:**

Appellants' arguments are respectfully traversed as follows. Appellants are arguing that it would not have been obvious to combine a feature of a secondary reference because the primary reference had not already disclosed the feature (taking into consideration the curvature of road). Such arguments are puzzling. If the primary reference indeed took the road curvature into account, a 35 U.S.C. § 102 rejection would have been made. The rejection made was a 35 U.S.C. § 103 rejection. The missing feature that the primary reference did not take into account was the curvature of the road (radius of the curvature). A secondary reference was made of record and relied upon for the missing claimed feature. A motivation statement was clearly set forth which stated that the added detail of the radius of the curvature (curvature of the road) would reduce the errors in the final result (See Final Office Action dated 2/22/2007 second half of page 5).

Arguing that there is no motivation to combine a feature of a secondary reference with features of a primary reference simply because the primary reference does not disclose the feature are unpersuasive (if that had been the case, a 35 U.S.C. § 102 rejection would have been applied).

Additionally, in view of the KSR v. Teleflex ruling, in applying the technique of using the road curvature in determining the final claimed result, one of ordinary skill in the art would have recognized that the application of the known technique (using road curvature) would have yielded a predictable result (more reliability and decrease error margin of the final result).

10.3 **Examiner Summary:**

10.3.1 Appellants argued that it there is no motivation to combine the features of a secondary reference into the primary because the primary reference did not mention the missing features. The Examiner provided sufficient motivation for the combination as believed to be demonstrated above. Furthermore, additional rationale was provided in view of the KSR v. Teleflex ruling.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/DAVID SILVER/ 10/18/2007
David Silver, Patent Examiner, Art Unit 2128

Conferees:

EDDIE C. LEE
SUPERVISORY PATENT EXAMINER

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